

**“...Envidio a los chicos de ocho años que dominan la red. Ellos lo han podido hacer veinte años antes que yo. Yo tuve que inventarlo para poder hacer lo que ellos hacen.”**

Vinton Cerf - *Pioneer de Internet*

Interview made from maintained them {char personally with the Dr. {Cerf the 25 of June of 1999 (in San jOse, {CA); 20-May-2000 ({Tarragona), 12-6-01 ({Stockholm) and completed with electronic correspondence of days 23-6-01 ({Tenerife) and 23-11-01 (Barcelona).

The Internet history would not be understood without its contribution, without a doubt this summary reflects because {Cerf receives the affectionate nickname of "Internet father", although it insists on signing like "*Internet {to pioneer*". {Vint, is a man who has passed his life solving complicated technological with simple ideas and shining problems.

Been born in {Newhaven the 23 of June of 1943. With great interest by the mathematics already in the school, and to the intellectual challenges that these raised, one received the master's degree in this matter in Stanford in 1965, simultaneously that was registered to all the courses on computers that could be found there. Its formation took to him to work like systems engineer in IBM during two years. Its work with the first computers of timesharing took to him to be interested still more in its possible optimization, graduating and {doctorando itself<sup>1</sup> in the University of Los Angeles, California ({UCLA).

In 1960, {UCLA was the research center par excellence on networks of computers. It was there in where it knew to some of the pioneers of the network like {Leonard {Kleinrock<sup>2</sup>, {Steve {Crocker<sup>3</sup> and to the same {Jon {Postel<sup>4</sup>.

2 of September of 1969, both attend the connection and installation of first computers connected remotely in {UCLA, starting up ARPANET. A month later a computer from Stanford, university was connected to which it was transferred like professor of *Electrical Engineering and Ciencias of the Computation* finalized its doctorate. It was there in where its great contribution to the development of Internet took place: the design next to {Bob {Khan<sup>5</sup> of protocol {TCP<sup>6</sup>

History was simple; {Bob {Khan who worked in company {BBN ({Bolt {Beranek & {Newman) who constructed the first computers of

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<sup>1</sup> Years 1970 and 1972 respectively.

<sup>2</sup> Author of the concept of "commutation of packages". It see its personal interview.

<sup>3</sup> Known to design the first communication protocol between computers. And the "Network {Protocol Control".

<sup>4</sup> It altruistically maintained the main servers of the system of dominion names ({DNS) during almost 30 years.

<sup>5</sup> Robert And {Khan. It see its personal interview.

<sup>6</sup> {TCP: {Transport {Protocol Control. More ahead divided in two. The {TCP and the IP (or Internet Protocol)

network {was fichado by {Larry {Roberts to work for ARPA. And from {Khan he already proposed to him there to {Cerf to work in the Inter-Networking {problem: that it consisted of connecting the different networks that worked under commutation of packages, so that any computer of one of them could speak with any computer of another one; assuring independence the connected networks, without a central control and using specific computers<sup>7</sup>.

The base of the idea that solved the problem outlined it in on in the hall of a hotel of San Francisco in March of 1973; and in 1974 {Cerf and {Khan they already published its well-known article: *To {protocol {for {Packet {Interconnection Network*.

Thus it is as the Tcp-IP were born, the language which all the connected computers speak nowadays to Internet, to interchange information and the one that in the future will allow to any device invented by the man, power to be interconnected.

In 1989, (commercial mail with Internet) connects the {MCI-Mail and other companies follow to him, from that day the experiment has not stopped to grow...

In 1992 it creates the Internet Society, (ISOC) of which he is president between 1992 and 1995, being one of his last bets, the one to create *the {Interplanetary Network*<sup>8</sup> or what is the same: to use the standard Tcp-IP for the networks that are constructed in other planets, lowering the price of costs. At the moment he is the president of {ICANN, the authority for the allocation of names and numbers in Internet.

## **It remembers when had the first contact with a computer?**

In 1958 I saw a computer for the first time. It was a model {SAGE<sup>9</sup>, fact of emptiness valves, that were in *the {Development System Corporation* of Santa Monica (Californian). The first machine with that I programmed went an a {Bendix {G-15, that worked with paper tapes, in the {UCLA university (1960). The following one with that I worked was a {Burroughs {B5000 and {B5500 programming in {BALGOL, in the University of Stanford in 1961. In 1965, during my stay of two years in IBM, {utili c {é IBM 7044. , in {UCLA and like student soon again already graduated, I had the opportunity to use 7090 IBM and {Scientific Data Systems ({SDS) Sigma-7.

When I returned to educational and investigating Stanford like, I also took control of a {Pdp-11 Digitalis and with the series of {Pdp-10 models. In 1979 I acquired an Apple {Ile and to {ctualmente I have several {Macintoshes and IBM PC ({Thinkpad).

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<sup>7</sup> Processors of specific intention, to interconnect networks: the {Gateways calls. And later {Routers.

<sup>8</sup> It see <http://www.w.w.ipnsig.org>

<sup>9</sup> {SAGE: {Semi-Automated {Ground {Enviroment.

## Which was his first experience with Internet or

- It was in {UCLA when the first node of ARPANET there, in September of 1969. I programmed the Sigma-7 to interact with the ARPA network (this first server of the network).
- I designed Internet and protocol {TCP/IP with Kahn in 1973.
- The first implementation of the {TCP became in {Pdp-11 of Stanford, and that soon was s {eguida work s of {Ray {Tomlinson<sup>11</sup> of the company {Bolt {and {Newman and finally, by an implementation {Kirstein in the {University {College {of The one of {BBN it worked on a {Pdp-10 {TENEX of the {UCL in a Digitalis {Pdp-9. Inverti' all year my equipment of graduated, completing the first specification of the {TCP (that was published in 1974, Co-signed by {Yogen {Dalal and Carl

## Emphasize a pair of aspects that considers Internet?

Its highest redundancy and the distributed control; commutation of packages allows {to multiplexar very "together connections", on such carrying circuits simultaneously.

## Which went its contribution to the development Internet?

I designed, next to {Bob Kahn, the original protocol of the basic architecture of Internet, including the footbridges ({gateways) now called {routers.

Note of the Author: Nowadays protocol IP, is used by telephones, satellites, in the future cars, microwaves, moving ball-point pens used protocol IP and when it is in march the new which great number of technicians is working, as he says: *each able to have its page Web.*

## It could name some landmarks that seem fundamental to him of the history of Internet?

- May of 1974: first publication of the design of Internet in the IEEE {Transactions {on {Communications.
- December of 1974: first complete version of the specifications of the {TCP

## Arpanet?

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Robert And

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<sup>10</sup> {BCPL: BASIC {Computer {Programming {Language. Basic language of programming of computers.

<sup>11</sup> {Ray {Tomlinson: he was the one who defined the use of the sign "@" for the email.

- 22 November of 1977: 1<sup>a</sup> public demonstration of an Internet of 3 networks<sup>12</sup>.
- 1 of January of 1983, migration towards {TCP - IP of the three initial networks ARPANET, {SATNET, {PRNET.
- 1986, commercial beginnings of {routers ({p.ej: {Proteon, Cisco)
- 1989, interconnection of MCI Mail with Internet. Beginning of the commercial service of {PSINET, {UUNET, {CERFNET.
- 1989, invention of the WWW by {Tim Berners-Lee.
- 1992, appearance of {MOSAIC navigator, application of the World Wide Web.

### **To whom it would emphasize by his contribution to the development of Internet?**

#### **Internet:**

Robert and Kahn (ARPANET and Internet); {David Clark; {Jon {Postel; Robert {Braden; {Stephen T {Kent; Dan {Lynch (migration to {TCP of ARPANET); {Yogen {Dalal, Carl {Sunshine, Richard {Karp, James {Mathis, Ronald Crane, all those graduated as Stanford that worked in the Tcp-IP in my laboratory; {Dennis {Jennings of the NSF<sup>13</sup> to choose the {TCP/IP for the {NSFNET; {Stephen {Wolff ({NSFNET), Hans-Werner Braun ({MERIT - {NSFNET); {Gerard {LeLann (worked in Stanford in the design of the {TCP although she was of the {IRIA<sup>14</sup> of {Franc {ia); John {Shoch and {Bob {Metcalfe who worked in Xerox {PARC and came to my seminars of Stanford on {TCP); Peter {Kirstein of {UCL and his students; {Bill {Plummer of {BBN; {Noel {Chiappa ({MIT) worked in {routers; Virginia {Strazisar (first {gateway - in {BBN)... she is one LONG ready one... specially the one of the most recent people, as of 1983. {Larry {Landweber and {David {Farber ({CSNET); {David {Crocker, John {Vittal, {Ray {Tomlinson - one of the first services of {mail for ARPANET and Internet

#### **ARPANET:**

{Stephen D {Crocker (by its pioneering work in the predecessor of the {TCP: the {NCP that worked in the origin of ARPANET); {Larry {Roberts (ARPANET), {Len {Kleinrock (by its contribution defining the concept of *{packet {switching*).

{Howard Frank (by the topology of ARPANET); Frank {Heart and the rest of the {BBN equipment; {Donald W. Davis, of the {National {Physical {Laboratory, England (an inventor of the commutation of

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<sup>12</sup> {Vint {Cerf and Robert Kahn organized a demonstration in which the viability was shaped to interconnect the different networks from ARPA: from a caravan located in {Bay Area ({CA, THE USA) the messages circulated through the {EUA by means of Arpanet, soon arrived at I {University {College of London and returned to Virginia, now via satellite, to end up arriving, again on Arpanet, to the {University {of Californian {Southern and concretely, to their institute of Sciences of the Information.

<sup>13</sup> NSF: National Science Foundation. Organism that financed network {NSFNET.

<sup>14</sup> {IRIA: {Institut de {Recherché {d'Informatique ET of {Automatique. Located in France.

packages)<sup>15</sup>; Paul {Baran ({RAND, the USA) another inventor of the commutation of packages. .>.

### **What thinks that {it will deparará to us the future?**

I see a fast expansion of Internet, thanks to the access "without cables" (specially the 802,11 to i b), an expansion of the interplanetary operation<sup>16</sup>, and the arrival of very many applications<sup>17</sup>, the increase of the bandwidth (Internet radio, TV), and the substitution of the mail of first class by the email and the services Web.

MATERIAL: Some of the data to complement the interviews, have been gathered of the speech of their investiture like Dr {Honoris causes of the {URV distributed by the Dr {Manuel {Sanromà.

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<sup>15</sup> {Donald W. Davis invented the term of "{packet {switching" or commutation of packages.

<sup>16</sup> {Interplanetary Network ({IPN), network that would connect the space probes with the terrestrial investigators by means of a network inspired by Internet (<http://www.ipnsig.org/>).

<sup>17</sup> <http://www.ceiva.com/>